CLAIMS

1. A device for contacting two volumes of fluid, the device comprising:

(a) a first channel having a fluid inlet and a first fluid divider for dividing the fluid in the first channel into discrete segments;

(b) a second channel having a fluid inlet and a second fluid divider for dividing the fluid in the second channel into discrete segments; and

(c) a third channel connecting the first and second channels.

2. The device of claim 1, wherein the first or second fluid divider comprises one or more sources for an immiscible fluid.

3. The device of claim 2, wherein the source for the immiscible fluid is an enclosed chamber connected to the first or second channel.

4. The device of claim 1, further comprising a constriction in the first channel.

5. The device of claim 1, further comprising a constriction in the second channel.

6. The device of claim 1, wherein the contact angle of an aqueous solution with the surface of the first channel is greater than 90°.

7. The device of claim 1, wherein the contact angle of an aqueous solution with the surface of the second channel is greater than 90°.

8. The device of claim 1, wherein the contact angle of an aqueous solution with the surface of the third channel is greater than 90°.

9. The device of claim 1, wherein the contact angle of an aqueous solution with the third channel can be reduced to less than 90° by the application of light or an electric field.

10. The device of claim 1, wherein the first or second channel comprises a chamber having a volume of 0.1 pL – 100 μL.

11. The device of claim 10, wherein said chamber contains an affinity capture agent.

12. The device of claim 11, wherein said affinity capture agent comprises a bead, gel, or chemical species bound to the chamber surface.

13. A method of contacting two fluids, the method comprising the steps of:

(a) providing a device comprising:

(i) a first channel having a fluid inlet and a first fluid divider for dividing the fluid in the first channel into discrete segments;

(ii) a second channel having a fluid inlet and a second fluid divider for dividing the fluid in the second channel into discrete segments; and

(iii) a third channel connecting the first and second channels;

(b) pumping a first fluid through the inlet into the first channel and pumping a second fluid through the inlet into the second channel;

(c) employing the first fluid divider to divide the first fluid into a plurality of segments to form a first segment connected to the third channel;

(d) employing the second fluid divider to divide the second fluid into a plurality of segments to form a second segment connected to the third channel; and

(e) contacting the first and second segments via the third channel.

14. The method of claim 13, wherein the first fluid divider comprises one or more sources for fluid immiscible in the first fluid, and wherein step (c) comprises introducing the immiscible fluid into the first channel to divide the first fluid into a plurality of discrete segments.

15. The method of claim 14, wherein the source for the immiscible fluid is an enclosed chamber connected to the first channel.

16. The method of claim 13, wherein the second fluid divider comprises one or more sources for fluid immiscible in the second fluid, and wherein step (d) comprises introducing the immiscible fluid into the second channel to divide the second fluid into discrete segments.

17. The method of claim 14, wherein the source for the immiscible fluid is an enclosed chamber connected to the second channel.

18. The method of claim 13, wherein the first fluid comprises a cell, and the second fluid comprises a lysis solution capable of lysing the cell.

19. The method of claim 16, wherein the first segment in step (c) comprises the cell, and the second segment in step (d) comprises the lysis solution, wherein the cell is lysed in step (e).

20. The method of claim 16, wherein the device further comprises a constriction in the first channel, and wherein in step (b), the cell does not flow through the constriction.

21. The method of claim 13, wherein the first fluid has a contact angle of greater than 90° with the surfaces of the first and third channels.

22. The method of claim 13, wherein the second fluid has a contact angle of greater than 90° with the surfaces of the second and third channels.

23. The method of claim 13, wherein the volume of the first or second segment is 0.1 pL – 100 μL.

24. The method of claim 13, wherein said contacting in step (e) occurs by reducing the pressure in the third channel relative to the first and second channels.

25. The method of claim 13, wherein said contacting in step (e) occurs by reducing the contact angle of the first and second fluids with the third channel to less than 90°.

26. The method of claim 13, wherein step (e) occurs prior to step (b) or step (c).

27. A method for capturing an analyte, said method comprising the steps of:

(a) providing a device comprising a channel having a first and a second inlet and a region containing an affinity capture agent;

(b) introducing a first fluid into said channel via said first inlet;

(c) introducing a second fluid into said channel via said second inlet;

(d) allowing said first and second fluids to come into contact to effect the release or production of said analyte; and

(e) capturing at least a portion of said analyte on said affinity capture agent.

28. The method of claim 27, further comprising eluting said analyte from said affinity capture agent.

29. The method of claim 27, wherein the surfaces of said channel are derivatized to prevent adsorption of said analyte.

30. The method of claim 27, wherein said first fluid comprises a cell, and said second fluid comprises a lysing solution.

31. The method of claim 27, wherein said analyte is a nucleic acid.

32. The method of claim 27, wherein said affinity capture agent comprises silica or an ion exchange resin.